Redstone Arsenal

Revision
ST. 6/9/88

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

N/A

Rationale for attributing the contaminants to the facility:

N/A

A value of 0 was assigned.

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

Only those areas in the south-central portion of RSA (Areas X, X1, Z, and FF) were considered for the surface water route because these are the only areas on RSA from which overland flow may reach RSA Surface Water Intake Plant 1 (Ref. 12). This is the only surface water intake within three stream miles downstream of a hazardous substance (Ref. 20). A description of each of these areas and the types of hazardous waste they contain follows:

delete

Area X: Inactive chemical storage area (Ref 4, p. 29). This area was used as an open drum storage area of mustard gas, a hazardous substance under RCRA (Ref. 29, p. 1885) and lewisite, an arsenic containing chemical warfare agent (Ref. 4, p. 6, Ref. 7, p. II-37).

Area X1: Demolition area ash disposal site (Ref. 4, p. 30). This area was used to dispose of ash residues from the open burning/open detonation grounds (Area FF) (Ref 4, p. 30). Contaminants detected in soil samples in the open

burning/open detonation grounds were contaminated with tetrachloroethylene, methylene chloride, trichloroethane, and trichloroethylene (Ref. 25, pp. 6 through C-5).

Area Y: Inactive mustard gas storage area (Ref. 4, p. 31). This area was used as an open drum storage area for mustard gas, a hazardous substance under RCRA (Ref. 29, p. 1885).

Area Z: Inactive toxic area (Ref 4, p. 32). This area was used as a dimilitarization, treatment, and disposal site for wastes (Ref. 4, p. 32). These wastes included nitric acid, beryllium, and phosgene (Ref. 23, p. 3-25), and chromate waste (Ref. 28, and Ref. 7, pII-68)

Area AA: Inactive chemical storage area (Ref. 4, p. 33). This area was used as an open drum storage area for mustard gas, a hazardous substance under RCRA (Ref. 29, p. 1885).

Area FF: Active demolition area and open burning/open detonation area (Ref. 4, p. 38). This area is used as a demolition area for munitions, rocket motor manufacturing wastes, and propellant wastes (Ref. 4, p. 38). Analysis for volatile organics in soil boring samples indicated that there was contamination from volatile organic compounds (Ref. 25, pp. 6 through C-5). The following volatile organic compounds were detected: tetrachloroethylene, methylene chloride, trichloroethane, and trichloroethylene (Ref. 23, pp. 6 through C-5).

Area Y: Elevation of southeast corner - 600 feet (Ref. 12).
Elevation of west central boundary at stream intersection - 560 feet (Ref. 12).
Distance between these points - 2,000 feet (Ref. 12).

$$\text{Slope} = \frac{600-560}{2{,}000} \times 100 = 2.0\%$$

Area X: Elevation of northeast corner - 570 feet (Ref. 12).
Elevation of west central border at point of stream intersection - 560 feet (Ref. 12).
Distance between these points - 3,200 feet (Ref. 12).

$$\text{Slope} = \frac{570-560}{3{,}200} \times 100 = 0.3\%$$

Area X1: Not possible to ascertain elevations. Only one contour line passes through this area (Ref. 12 and Ref. 31).

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Rationale for attributing the contaminants to the facility:

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

continue here →

Average slope of facility in percent:
Areas FF, X1 and 2 are essentially flat (Refs. 12 and 31).

Name/description of nearest downslope surface water:
Area X1 drains into a wetland and then into a unnamed perrenial stream NW of the site. (Ref. 5, 12, ...
Area FF at the North end, drains into a unnamed stream on the north side. (This is same stream for area X1 above).

Average slope of terrain between facility and above-cited surface water body in percent:
There is not adequate slope between areas FF, X1 and 2 and the nearest downslope surface water into which they flow to obtain a value for facility slope and intervening terrain. (Refs. 12 and 31).

Is the facility located either totally or partially in surface water?
None of the waste areas are known to be totally or partially in surface water. (Refs. 12 and 31).

Area 2 drains into 2 unnamed perrenial streams which are about equidistant from waste on the area. There are:
1) a wetland just to the north of area (00)

Z. This wetland then drains to an unnamed perennial stream to the east of area Z.
2) a perennial stream on the west side of area Z. (This is the same stream into which area X1 and F drain.)
(Refs. 12 and 31).

Delete this page — Ron — essentially flat

Ron Hagler agreed & said area is essentially flat

565 flat

Area Z: Not possible to ascertain elevations. ~~Only one contour line passes through this area~~ (Ref. 12) and Reference 31).

delete

~~Area AA: Elevation of northeast corner - 560 feet (Ref. 12).~~
~~Elevation of southwest corner - 550 feet (Ref. 12).~~
~~Distance between these points - 1,900 feet (Ref. 12).~~

~~Slope = $\frac{560-550}{1,900}$ X 100 = 0.5%~~

solvents poured out in SE corner in part

583 SE corner
560 NW

Area FF: Elevation of southeast corner - 570 feet (Ref. 12).
Elevation of northwest corner - 560 feet (Ref. 12).
Distance between these points - 2,400 feet (Ref. 12).

$\frac{583-560}{2400} \times 100 = .958\%$

Slope = $\frac{570-560}{2,400}$ X 100 = 0.4%

Buried bulk propellants at NW corner

Name/description of nearest downslope surface water:

delete Y, AA, Y

~~Area X: "Unnamed" perennial stream (Ref. 12).~~
Area X1: "Unnamed" perennial stream (Ref. 12).
~~Area Y: "Unnamed" perennial stream (Ref. 12).~~
Area Z: "Unnamed" perennial stream (Ref. 12).
~~Area AA: "Unnamed" perennial stream (Ref. 12).~~
Area FF: "Unnamed" perennial stream with static water (Ref. 12).

Average slope of terrain between ~~facility~~ waste and above-cited surface water body in percent:

delete → ~~Area X: N/A; this area is transected by a perennial stream (Ref. 12).~~
Area X1: Elevation of northeast corner - ~~570~~ 565 feet (Ref. 12). — 565 or greater Ron
Elevation of stream - 565 feet (Ref. 12). → 565 site about 800' ditch
Distance between these points - 100 feet (Ref. 12).

$\frac{565-565}{800} \times 100 = 0^{\circ}$

Slope - $\frac{570-565}{100}$ X 100 = 5%

delete — ~~Area Y: N/A; this area is transected by a perennial stream (Ref. 12).~~
~~Area Z: N/A; this area is transected by a perennial stream (Ref. 12).~~
delete — ~~Area AA: N/A; this area is transected by a perennial stream (Ref. 12).~~
Area FF: Elevation of northwest corner - 560 feet (Ref. 12).
Elevation of stream - ~~555 feet (Ref. 12)~~ — 556 - Ron
Distance between these points - 100 feet (Ref. 12).

Slope - $\frac{560-555}{100}$ X 100 = 5.0%

$\frac{560-556}{300} \times 100 = 1.33\%$

area Z! Ron, is essentially no elevation from the nearest known site waste to the nearest stream 300' to 400 ft away on the West side of the site (Ref 31)

Is the facility located either totally or partially in surface water?

~~No.~~ However areas FF, X1 and Z are in the 100 year flood plain. A 100 yr flood occurred in 1973 and areas FF and Z were lagoons to contain water. However, it is not possible to verify that these sites had water on the surface in 1973 when the 100 yr. flood occurred.

~~Yes, Areas X, Y, Z, and AA are transected by perennial streams (Ref. 12).~~

~~A value of 3 was assigned.~~

Is the facility completely surrounded by areas of higher elevation?

No (Ref. 12).

1-Year 24-Hour Rainfall in Inches

3.25 inches (Ref. 1, 47 FR 31223)

A value of 3 was assigned.

Distance to Nearest Downslope Surface Water

~~Area X: zero feet (Ref. 12)~~
Area X1: ~~100 feet (Ref. 12)~~ 800 feet (Refs. 31 and 12).
~~Area Y: zero feet (Ref. 12)~~
Area Z: ~~zero feet (Ref. 12)~~ 300 to 400 feet (Refs. 31 and 12).
~~Area AA: zero feet (Ref. 12)~~
Area FF: ~~100 feet (Ref. 12)~~ 250 to 300 feet (Refs. 31 and 12).

A value of 3 was assigned.

Physical State of Waste

Propellant-contaminated solvents were poured into open pits in Area FF and burned (Ref. 6).

Chromate chemical waste solution and sludges were buried in the ~~demolition area (Area X1a)~~ Area Z (Ref. 7, p. II-68 and Ref. 30).

Therefore, physical state of hazardous waste at the time of deposition was liquid and sludges.

A value of 3 was assigned.

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

The open burning area (Area FF) consisted of open unlined pits (Ref. 6). Also, Area X1 was a landfilling type of operation. There is a soil cap but it does not preclude runoff (Refs. 6, and 32). Furthermore, there is no runoff diversion system for any areas in the south-central portion of RSA (Ref. 6).

Method with highest score:

Landfill, no adequate cover and no diversion system.

A value of 3 was assigned.

* * *

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

	Toxicity	Persistence
trichloroethylene (Ref. 25, p. 6)	2 (Ref. 14, p. 2622)	3 (Ref. 1, 47 FR 31229)
tetrachloroethylene (Ref. 25, p. 6)	2 (Ref. 14, p. 2517)	3 (Ref. 1, 47 FR 31229)
chromate compound (Ref. 7, p. II-68)	2 (Ref. 14, p. 2	
chlorobenzene (Ref. 25, p. 6)	2 (Ref. 1, 47 FR 31229)	2 (Ref. 1, 47 FR 31229)

Compound with highest score:

Trichloroethylene and tetrachloroethylene both have a matrix value of 15 (Ref. 1, 47 FR 31229).

A matrix value of 15 18 was assigned.

and chromate compounds have a matrix value of 18 (Ref. 1).

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Sufficient documentation does not exist to calculate the total quantity of hazardous waste at ~~RSA~~. However, the following quantities are documented at ~~Demolition Area~~ Area 2:

1) 7,000 gallons = chromate waste (Ref. 7, p. II-68) and Ref. 30).
Total Quantity = 140 drums

Basis of estimating and/or computing waste quantity:

~~The above values were converted to common units and summed.~~

A value of 3 was assigned.

2. Area FF. 109,972 lbs of solvents, propellents, contaminated rags and paper, and paint residue (Ref 35). This quantity converts to 216 drums (Ref 1).

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

The RSA Surface Water Intake No. 1 is located on the Tennessee River and is located less than three miles downstream of Area FF (Refs. 12, 18, and 33). This intake is used to supply RSA with drinking water (Ref. 9, p. 17).

A value of 3 was assigned.

Is there tidal influence?

No (Ref. 20)

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

N/A

a wetland larger than 20 acres is located on the west side of area FF. There is water in the NW corner of area FF about 400 ft. from the wetland. (Refs. 12 and 34).

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

~~250 feet. Area FF is located 250 feet east of a 44 acre wetland (Ref. 12).~~ Waste from area FF

A value of ~~3~~ 2 was assigned for distance to sensitive environment.

Distance to critical habitat of an endangered species ~~or national wildlife refuge~~, if 1 mile or less:

N/A

~~Zero miles. Area FF, Area Y, and Area X are all partially located within the Wheeler National Wildlife Refuge (Ref. 12).~~

~~A value of 3 was assigned for distance to sensitive environment.~~

Population Served by Surface Water

Location(s) of water-supply intake(s) within a 3-miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

RSA SW Intake - Plant 1: primary drinking water intake for RSA located due west of Area X1 on the Tennessee River.

This surface water intake supplies approximately 11,280 people with drinking water. (Ref. 18; Ref. 9, p. 17)

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

There is no irrigation on RSA (Ref. 8).

Total population served:

11,280 (Ref. 9, p. 17)

Name/description of nearest of above water bodies:

The Tennessee River is located along the southern boundary of RSA. (Ref. 12)

Distance to above-cited intakes, measured in stream miles.

1.24 miles (Ref 12).

5,865 feet from Area XI to RSA Water Intake Plant 1 as measured on USGS 7.5 minute topographic map (Ref. 12). Distance calculation was performed using a computerized digitizer.

A value of 30 was assigned.